

**What is claim d is:**

1. An apparatus adapted to transport and organize containers in a manufacturing operation, comprising;

(A) an upstream conveyor assembly having a load area at an upstream location thereof and operative to transport containers placed thereon in a downstream direction thereby to create a reservoir of containers at a downstream supply area thereof;

(B) a downstream conveyor assembly including a plurality of bays each sized and adapted to receive a single container therein and operative to transport containers in the downstream direction from an intake location to a discharge location such that said containers will be discharged in single file at the discharge location, said downstream conveyor assembly operative to sequentially advance said bays past the intake location; and

(C) a transfer assembly operative to sequentially remove selected containers one at a time from said reservoir and sequentially transport each said selected container to the intake location of said downstream conveyor assembly and thereafter deposit each selected container into a respective said bay as said bays are sequentially advanced past the intake location by said downstream conveyor assembly.

2. Apparatus according to claim 1 wherein said upstream conveyor assembly includes:

(1) a longitudinally extending first upstream conveyor having a first upstream conveyor belt with a first upstream belt advance portion and a first upstream belt return portion; and

(2) a longitudinally extending second upstream conveyor having a second upstream conveyor belt with a second upstream belt advance portion and a second upstream belt return portion,

wherein said first and second upstream conveyor belts are located longitudinally alongside one another with said first upstream belt advance portion and said second upstream belt advance portion being oriented at an orientation angle with respect to one another thereby to define support surfaces for containers placed thereon.

3. Apparatus according to claim 2 wherein the orientation angle is about 90°.

4. Apparatus according to claim 2 wherein said first and second upstream conveyors longitudinally spiral over a rotational angle from the upstream location toward the downstream location.

5. Apparatus according to claim 4 wherein the rotational angle is about 45°.

6. Apparatus according to claim 2 wherein said first and second upstream conveyors are driven at a common rate of speed and including at least one divider panel adapted to be removably secured to said first and second upstream belt advance portions for common movement therewith such that, when secured, said divider panel forms an upstream wall for supporting containers located downstream thereof thereby to define a supply bin of variable size for holding said reservoir of containers

7. Apparatus according to claim 1 wherein said upstream conveyor assembly includes a cassette loader located at the load area and movable between a load position and an unload position, said cassette loader adapted to receive a bulk supply of said containers when in the load position and operative when moved

to the unload position to deposit said bulk supply of containers onto said upstream conveyor assembly for transport in the downstream direction toward said transfer assembly.

8. Apparatus according to claim 7 wherein said cassette loader is pivotally supported relative to said upstream conveyor assembly.

9. Apparatus according to claim 8 wherein said cassette loader includes a cassette bottom wall, at least one cassette side wall and at least one cassette end wall for supporting containers placed therein.

10. Apparatus according to claim 1 wherein said downstream conveyor assembly includes a downstream conveyor belt having a downstream belt advance portion and a downstream belt return portion, said downstream conveyor belt having a plurality of vanes supported thereon for common movement therewith, said downstream conveyor belt and adjacent ones of said vanes defining said bays.

11. Apparatus according to claim 10 wherein said downstream conveyor includes a restraining guide extending alongside and is spaced relation to said downstream belt advance portion and operative to retain containers within said bays as said containers are advanced from the intake location to the discharge location.

12. Apparatus according to claim 11 wherein said restraining guide includes a guide panel having a width about the same as said downstream conveyor belt.

13. Apparatus according to claim 11 wherein the intake location is situated at a junction region of said downstream belt advance portion and said downstream belt return portion of said downstream conveyor belt, said restraining guide including an arcuate guide portion extending at least partially around said downstream belt advance portion and said downstream belt return portion at the intake location.

14. Apparatus according to claim 1 wherein said downstream conveyor assembly includes a discharge ramp disposed proximately to the discharge location.

15. Apparatus according to claim 1 wherein said transfer assembly includes rotatable transfer wheel having a plurality of radially projecting prongs oriented to engage each of the selected containers and sequentially transport each said selected container to the intake location of said downstream conveyor assembly.

16. Apparatus according to claim 15 wherein said transfer assembly includes a chute having a terminal end located proximately to said transfer wheel, said chute adapted to receive containers from said reservoir and dimensioned to allow single file passage of said containers therethrough.

17. Apparatus according to claim 16 including a shoe disposed at the terminal end of said chute, said shoe adapted to position each said selected container for engagement by said transfer wheel.

18. Apparatus according to claim 1 wherein said transfer assembly includes generally parallel first and second plate portions forming a chute, said first and second plate portions spaced apart from one another a distance selected to allow single file passage of said containers therethrough.

19. Apparatus according to claim 18 wherein said first plate portion is reciprocally movable in the upstream and downstream directions.

20. Apparatus according to claim 18 wherein said second plate is movable and including a sensor associated therewith to detect deflections of said second plate that are greater than a selected threshold.

21. Apparatus according to claim 1 wherein said transfer assembly includes a paddle member pivotally disposed at a position to act on containers in said reservoir.

22. Apparatus according to claim 21 including means operative to reciprocally pivot said paddle member.

23. An apparatus adapted to transport and organize containers in a manufacturing operation, comprising;

(A) an upstream conveyor assembly having a load area at an upstream location thereof and operative to transport containers placed thereon in a downstream direction thereby to create a reservoir of containers at a downstream supply area thereof, said upstream conveyor assembly including

(1) a longitudinally extending first upstream conveyor having a first upstream conveyor belt with a first upstream belt advance portion and a first upstream belt return portion; and

(2) a longitudinally extending second upstream conveyor having a second upstream conveyor belt with a second upstream belt advance portion and a second upstream belt return portion,

wherein said first and second upstream conveyor belts are located longitudinally alongside one another with said first upstream belt advance portion and said second upstream belt advance portion being oriented at an orientation angle with respect to one another thereby to define support surfaces for containers placed thereon;

(B) a downstream conveyor assembly including a downstream conveyor belt having a downstream belt advance portion and a downstream belt return portion, said downstream conveyor belt having a plurality of vanes supported thereon for common movement therewith, said downstream conveyor belt and adjacent ones of

said vanes defining a plurality of bays each sized and adapted to receive a single container therein and operative to transport containers in the downstream direction from an intake location to a discharge location such that said containers will be discharged in single file at the discharge location, said downstream conveyor assembly operative to sequentially advance said bays past the intake location; and

(C) a transfer assembly operative to sequentially remove selected containers one at a time from said reservoir and sequentially transport each said selected container to the intake location of said downstream conveyor assembly and thereafter deposit each selected container into a respective said bay as said bays are sequentially advanced past the intake location by said downstream conveyor assembly.

24. Apparatus according to claim 23 wherein the orientation angle is about 90°.

25. Apparatus according to claim 23 wherein said first and second upstream conveyors are driven at a common rate of speed and including at least one divider panel adapted to be removably secured to said first and second advance portions for common movement therewith such that, when secured, said divider panel forms both an upstream wall for supporting containers located downstream thereof thereby to define a supply bin of variable size for holding said reservoir of containers

26. Apparatus according to claim 23 wherein said upstream conveyor assembly includes a cassette loader located at the load area and movable between a load position and an unload position, said cassette loader adapted to receive a bulk supply of said containers when in the load position and operative when moved to the unload position to deposit said bulk supply of containers onto said upstream

conveyor assembly for transport in the downstream direction toward said transfer assembly.

27. Apparatus according to claim 23 wherein said downstream conveyor includes a restraining guide extending alongside and is spaced relation to said advance portion and operative to retain containers within said bays as said containers are advanced from the intake location to the discharge location.

28. Apparatus according to claim 27 wherein the intake location is situated at a junction region of said advance portion and said return portion of said downstream conveyor belt, said restraining guide including an arcuate guide portion extending at least partially around said advance portion and said return portion at the intake location.

29. Apparatus according to claim 23 wherein said transfer assembly includes rotatable transfer wheel operative to sequentially transport each said selected container to the intake location of said downstream conveyor assembly.

30. Apparatus according to claim 29 wherein said transfer wheel includes a plurality of radially projecting prongs oriented to engage each of the selected containers.

31. Apparatus according to claim 23 wherein said transfer assembly includes a chute having a terminal end located proximately to said transfer wheel, said chute adapted to receive containers from said reservoir and dimensioned to allow single file passage of said containers therethrough.

32. Apparatus according to claim 31 including a shoe disposed at the terminal end of said chute, said shoe adapted to position each said selected container for engagement by said transfer wheel.

33. Apparatus according to claim 31 wherein said transfer assembly includes generally parallel first and second plate portions forming a chute, said first and second plate portions spaced apart from one another a distance selected to allow single file passage of said containers therethrough.

34. Apparatus according to claim 33 wherein said first plate portion is reciprocally movable in the upstream and downstream directions.

35. Apparatus according to claim 33 wherein said second plate is movable and including a sensor associated therewith to detect deflections of said second plate that are greater than a selected threshold.

36. Apparatus according to claim 23 wherein said transfer assembly includes a paddle member pivotally disposed at a position to act on containers in said reservoir.

37. An apparatus adapted to be positioned on a generally horizontal support surface when in an assembled state and operative to transport and organize containers in a manufacturing operation, comprising;

(A) an elongated upstream conveyor assembly positioned generally parallel to the support surface when in the assembled state with a load area at an upstream location thereof and operative to transport containers placed thereon in a downstream direction thereby to create a reservoir of containers at a downstream supply area thereof;

(B) an elongated downstream conveyor assembly positioned in an upright orientation relative to the support surface when in the assembled state including a plurality of bays each sized and adapted to receive a single container therein and operative to transport containers in the downstream direction from an intake location to a discharge location such that said containers will be discharged in single file at

the discharge location, said downstream conveyor assembly operative to sequentially advance said bays past the intake location; and

(C) a transfer assembly operative to sequentially remove selected containers one at a time from said reservoir and sequentially transport each said selected container to the intake location of said downstream conveyor assembly and thereafter deposit each selected container into a respective said bay as said bays are sequentially advanced past the intake location by said downstream conveyor assembly.

38. Apparatus according to claim 37 wherein said upstream conveyor assembly includes:

(1) a longitudinally extending first upstream conveyor having a first upstream conveyor belt with a first upstream belt advance portion that advances in a downstream direction that is generally parallel to the support surface when in the assembled state and a first upstream belt return portion; and

(2) a longitudinally extending second upstream conveyor having a second upstream conveyor belt with a second upstream belt advance portion that advances in a downstream direction that is generally parallel to the support surface when in the assembled state and a second upstream belt return portion,

wherein said first and second upstream conveyor belts are located longitudinally alongside one another with said first upstream belt advance portion and said second upstream belt advance portion being oriented at an orientation angle with respect to one another thereby to define support surfaces for containers placed thereon.

39. Apparatus according to claim 37 wherein said downstream conveyor assembly includes a downstream conveyor belt having a downstream belt advance portion positioned at a large acute angle relative to the support surface when in the assemble state and a downstream belt return portion, said downstream conveyor belt having a plurality of vanes supported thereon for common movement therewith, said downstream conveyor belt and adjacent ones of said vanes defining said bays whereby containers will be discharged in single file at the discharge location under gravitational force.

40. A method of handling and organizing containers in a manufacturing operation, comprising;

- (A) loading a bulk supply of containers at an upstream load area on an upstream conveyor assembly;
- (B) thereafter generally horizontally advancing the bulk supply of containers in a downstream direction thereby to create a reservoir of containers at a downstream supply area;
- (C) thereafter columnizing the containers into a single file column;
- (D) thereafter transporting each individual container to a location elevated with respect to said upstream conveyor assembly; and
- (E) thereafter discharging each said individual container.

41. A method of handling and organizing containers according to claim 40 wherein said containers are each elongated in configuration along a central axis and wherein the step of loading a bulk supply of containers at the an upstream location is accomplished by placing said containers on an upstream conveyor assembly with the central axes oriented generally horizontally and transversely to the downstream direction.